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INTEGRATED CROP MANAGEMENT

Assessing the risk of soybean rust for the 2004 season

In recent Iowa State University triage training meetings, a most talked about topic is how to assess the risk of soybean rust, specifically (1) whether the disease will show up in the 2004 season in the continental U.S., and (2) what damage potential it will have if the disease arrives this season. We summarized questions from participants and will address some of them.

How much further north has soybean rust been found?

According to confirmed reports, the occurrence of soybean rust in the Western Hemisphere is still limited to areas south of the equator. In Brazil, the most northern soybean production region is in Roraima State, which has about 25,000 acres soybean. The soybean area in Roraima is separated from other areas where the rust has been reported by the Amazon Forest. The soybean growing season in Roraima starts around May-June and soybean should be in the reproductive stage in July-August, the critical stage for rust development. By then, people should find out if the disease has indeed moved there.

Which way can the rust spread to North America?

There are several possibilities. Entry through natural pathways has been considered most likely by scientists and has been studied the most. Among the natural pathways, land bridging is the most likely for soybean rust to disperse to North America because previous introductions of other airborne diseases from South America were through this way. Introduction of the disease from West Africa, by hurricanes, is another possibility. In 1978, sugar cane rust was believed to have spread to the Caribbean, then to the U.S., from West Africa through this pathway.

On its way from South America, soybean rust should be detected before reaching the U.S. For the known cases of windblown diseases that previously entered the U.S. from South America, none reached the U.S. without being first reported in countries in Central America or the Caribbean islands.

What are the odds of seeing soybean rust this season?

Quite low if only introductions through natural pathways are considered. Computer modeling by scientists at Iowa State University and St. Louis University, generated in January, suggested that viable spores from Brazilian soybean production regions could blow to Argentina during their major growing season, but not toward the U.S. mainland. Reports from

Argentina from this April supported that prediction. After the season, there are much fewer spores in the air, and the major soybean growing season in South America ends in April.

However, there is a rumor that soybean rust is present in Roraima, Brazil, and Venezuela and our modeling did not include these areas. If the rumor is true, the likelihood of further expansion northward increases. Up to March, three independent Brazilian sources told us that the rumor was false.

What are the odds for a severe epidemic of soybean rust in the 2004 season?

If rust indeed shows up by surprise in the south this season, the possibilities of having a major epidemic in the North Central soybean production region is unlikely. To our knowledge, no diseases became severe and region-wide epidemics in their first year of detection after introduction into the U.S.

How fast would soybean rust spread in the U.S.?

To develop into epidemics, a rust disease needs to build up its population to a sufficient amount in the south in order to disperse northward, which takes time. For instance, at the outbreak of southern corn leaf blight in 1970, the disease was found endemic by mid-March in central Florida. By May 20, it had been in epidemic proportions in the coastal regions of Mississippi and Alabama before it reached Iowa in July. Since soybean rust has not been found in the continental U.S. yet, it is safe to say that, if rust arrives, an epidemic on a scale similar to the 1970 southern corn leaf blight will not happen this season.

In the continental U.S., other crops also have windborne rust diseases. In a growing season, these rusts typically travel about 20 miles a day in regions east of the Rockies. Historically, it takes more than a month for an airborne crop disease to spread from the southern coast to Iowa. If the disease entry point is in the south, Iowa farmers will have sufficient time to prepare for fungicide control.

What is the potential for yield loss if the disease arrives this season?

If soybean rust arrives in the U.S. in July or August this summer, as predicted by scientists at the University of Illinois, there are several possibilities. If the disease is first detected in coastal areas, it will take about a month to reach Iowa. The damage potential to soybean yield would be insignificant when soybean rust gets to Iowa after mid-August. The later the rust comes to Iowa in a growing season, the smaller the damage it causes.

XB Yang has been studying soybean rust since 1989 and currently chairs the North Central Soybean Rust Committee with expertise in disease risk assessment. Shimon Pivonia is conducting postdoctoral research on the risk of soybean rust.

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